of the sound pulse relative to the drift pulse could be varied. The intensity of the magnetic field could be smoothly varied from 600 to 13500 Oe.

The dependence of α_L on H was measured in the temperature interval 78 -- 300° K, and the dependence of the amplification of the sound on E and H was investigated at 78° K.

Figure 1 shows oscillograms of the sound pulse (f = 620 MHz) passing through the sample under different conditions. An appreciable intensification of the sound (40 dB) is observed at H = 4000 Oe and V = 20 V (Fig. 1c).

The measured dependence of the sound amplification on H at different values of the external field is shown in Fig. 2 (α is given in decibels relative to the initial sound signal, f = 620 MHz). The curves for f = 420 and 520 MHz have a similar form. The maximum gain changes approximately in proportion to the frequency.

For a comparison with formula (1), these data have to be recalculated with allowance for the dependence of v_{dr} on H.

When H < 2500 Oe and the gain is small, such a recalculation leads to satisfactory agreement with theory. At larger H, when the gain is large, deviations appear, caused apparently by the reaction of the amplified sound signal on the amplification process.

Therefore, better agreement with formula (1) can be expected in an investigation of the dependence of α_{el} on H^2 in the absence of a drift field. The $\alpha_{el}(H^2)$ curves for a number of temperatures corresponding to the region of impurity conductivity are shown in Fig. 3. We see that the dashed curves, calculated using the value $K^2 = 1.4 \times 10^{-3}$, agree satisfactorily with experiment.

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STIMULATED SCATTERING IN RUBIDIUM VAPOR

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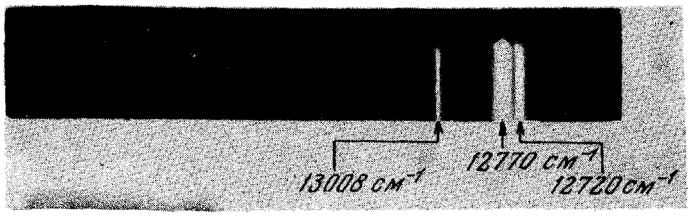
In [1] we reported observation of stimulated electronic Raman scattering and stimulated resonance-line emission in potassium vapor. In this paper we present the results of an investigation of the action of intense optical radiation on vapor of another alkali metal - rubidium.

We observed stimulated three-photon scattering under conditions close to resonance. A frequency $2\omega_{inc} - \omega_{at}$ appeared in this case in the spectrum, where ω_{inc} - frequency of incident radiation, and ω_{at} - frequency of the resonant transition $5S_{1/2} - 5P_{3/2}$ in rubidium vapor at the anti-Stokes frequency $\omega_{inc} + \Delta a_{at}$, where $\Delta\omega_{at}$ is the difference frequency between the levels $5P_{1/2}$ and $5P_{3/2}$.

Spectrogram of scattering in rubidium vapor.



The possibility of observing the process of three-photon scattering is indicated in [2]; certain theoretical calculations were made also in our laboratory (private communication by V. M. Arutyunyan). However, three-photon scattering was not observed distinctly in potassium vapor.

In our experiments, powerful radiation of the Stokes component of stimulated Raman scattering of chloroprene, excited by a ruby laser, was incident on a cell with rubidium vapor. The frequency of the given Stokes component, 12770 cm^{-1} [3], is close to the frequency of the resonant transition in rubidium, 12820 cm^{-1}. On the whole, the experimental setup was similar to that described in [1]. The effects indicated above were observed at a rubidium cell temperature $\sim 300°$ C, corresponding to a rubidium vapor pressure 2 mm Hg in the direction of the excited radiation.

As seen from the obtained spectrum (see the figure), a new line, due to absorption of two phonons of frequency 12770 cm^{-1} and emission of one photon at frequency 12720 cm^{-1}, is observed on the low-frequency side. The rubidium atom goes thereby from the $5S_{1/2}$ level to the excited level $5P_{3/2}$. The effect is observed only when the intensity of the incident radiation exceeds a certain threshold. At a larger incident intensity, under the same conditions, there is observed besides the indicated 12720 cm^{-1} line also radiation at frequency 13008 cm^{-1}, which can be attributed to stimulated electronic Raman scattering. The rubidium atom goes in this case from the $5P_{3/2}$ level to the $5P_{1/2}$ level through a virtual level.

The possibility of populating the $6S_{1/2}$ level in potassium by excitation with radiation at ruby-laser frequency and the Stokes stimulated Raman scattering (SRS) component of nitrobenzene leads to stimulated emission via a number of transitions in the infrared and ultraviolet regions of the spectrum. This was observed in [4], and also in our experiments, in which sufficiently intense lines of the transitions $5P_{1/2,\ 3/2} - 4S_{1/2}$ (wavelengths 4044 Å and 4047 Å) appeared in the spectra. In the experiments with rubidium, the presence or absence of the fundamental ruby-laser radiation in the incident beam (14400 cm^{-1}) did not influence the observed effects, since rubidium has no real transition with a frequency close to the ruby-emission frequency, as in the case of potassium. Photography of the spectra in the region 4000 - - 7000 Å revealed the absence of stimulated transitions from the upper level to the ground level (under the conditions of out experiment with rubidium).

One could expect in the experiments with rubidium also stimulated electron scattering of the fundamental ruby radiation from the $5P_{3/2}$ level to the $5P_{1/2}$ level (after a real population of the $5P_{3/2}$ level with the aid of the SRS chloroprene). However, the corresponding frequency $\omega_{las} + \Delta\omega_{at}$ is missing from the spectrum. This indicates that resonance plays an

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CONCERNING CERTAIN FEATURES OF THE STATIONARY JOSEPHSON EFFECT

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In discussions of the effect of superconductivity, Anderson [1] and Josephson [2] pointed out the role of fluctuations in superconducting tunneling. A distinct observation of the Josephson effects [3] is possible only in the case when the binding energy of the system is sufficiently large compared with the energies of thermal and other fluctuations. Vant-Hull and Mercereau [4] presented proof for the induced phase coherence. As shown by Larkin and Ovchinnikov [5], dissipative fluctuations introduced from an external circuit lead to the appearance of a finite band of frequencies radiated in the Josephson manner. Recently Ivanchenko and Zil'berman [6] considered the influence of thermal fluctuations on the Josephson direct current and have shown that a finite voltage appears on the barrier even in the region of currents where a superconducting tunnel current would be observed at $V = 0$ in the absence of fluctuations.

We report in this paper preliminary experimental results on the investigation of the stationary Josephson effect, which apparently offer evidence of the influence of fluctuations on the superconducting tunneling.

The object of the investigations were high-resistance (0.05 - 0.1 ohm-mm^2) Pb-I-Pb tunnel junctions with film thickness $\sim$ 1300 Å. For all the samples, the width of the junction was small compared with the double the Josephson depth of penetration ($2\lambda_j > W$), i.e., the distribution of the magnetic field and of the current over the sample was homogeneous. The maximum value of the observed superconducting current was 6 - 20% of theoretical. We investigated the behavior of the critical Josephson current in magnetic fields. Unlike the low-resistance samples ($\sim$ 0.01 ohm-mm^2), two types of dependences were clearly observed.

1. In certain fields, the superconducting "direct" current flows at a finite voltage across the barrier, retaining the periodic dependence on the field (Fig. 1).

2. The Josephson current exhibits no oscillatory dependence on the magnetic field (Fig. 2).

The first phenomenon is observed in all the investigated samples, and the second one is observed less frequently, with a greater probability in junctions that have higher resistance and are broad, but not larger than $2\lambda_j$.